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AUTOMATIC PICKUP FOR BAGS, TAGS, AND CARTONS IN
PACKAGING AND LABELING AGRICULTURAL PRODUCTS^{1/}

Jesse E. Harmond^{2/}

Many industries use bags, tags, cartons, and other items to package and label their products. To be filled or attached, these items must be removed one at a time from a stack.

In typical semiautomatic filling operations, the containers are removed from the pile by hand, opened, and placed under a weighing scale set to discharge at fixed time intervals. This is a practical way of handling small volumes, but sometimes the operator is unable to pick up, open, and position the container in the time allowed. To illustrate, a particular operation was observed where lawn seed was packaged in 5-pound plastic bags, and the scales were set on a 4-second cycle. Performance was good as long as the operator's rhythm was constant. However, when several bags clung together, or a bag could not be opened readily, the automatic scales would dump the seed before the operator had the bag in position. This caused delay, seed loss, and possible seed mixing in any salvage attempts.

In an effort to accelerate production and to reduce the operator's physical and mental strain, an automatic vacuum pickup was developed to lift the top bag or tag from a pile and suspend it within easy reach of the operator. The pickup has potential use in manufacturing and processing plants which handle seed, fertilizer, chemicals, or other commodities where bags, cartons, tags, or labels must be taken singly from a stack for filling or attaching.

Several forms of the vacuum pickup have been observed in operation at three locations since 1958. In a processing plant where bags were used to ship seed in interstate commerce, three tags were being attached to each bag. Three of the pickups were arranged in series so that the required set of three tags was lifted into position for the operator to place on each bag. Figure 1 shows a lifted tag being removed from the pickup.

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^{2/} Agricultural engineer, Agricultural Engineering Research Division, Agricultural Research Service, U.S. Department of Agriculture at Corvallis, Ore.

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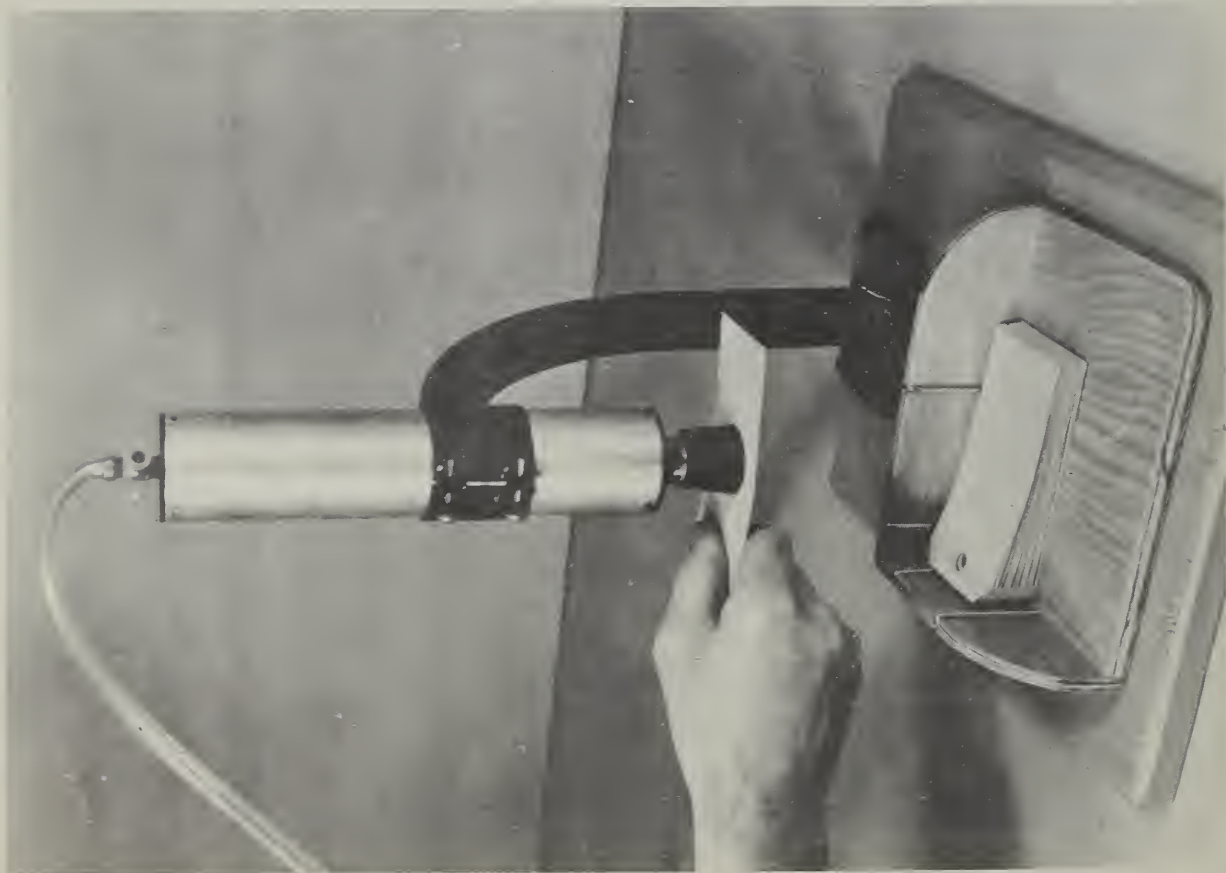


Figure 1. Vacuum tag pickup.



Figure 2. Vacuum bag pickup at start of lift cycle.

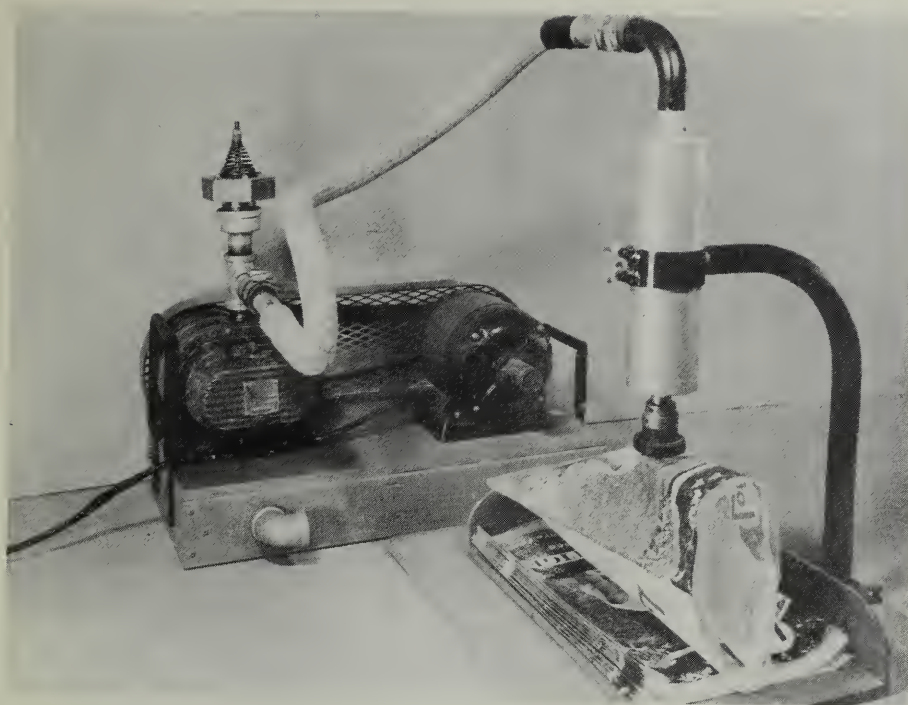
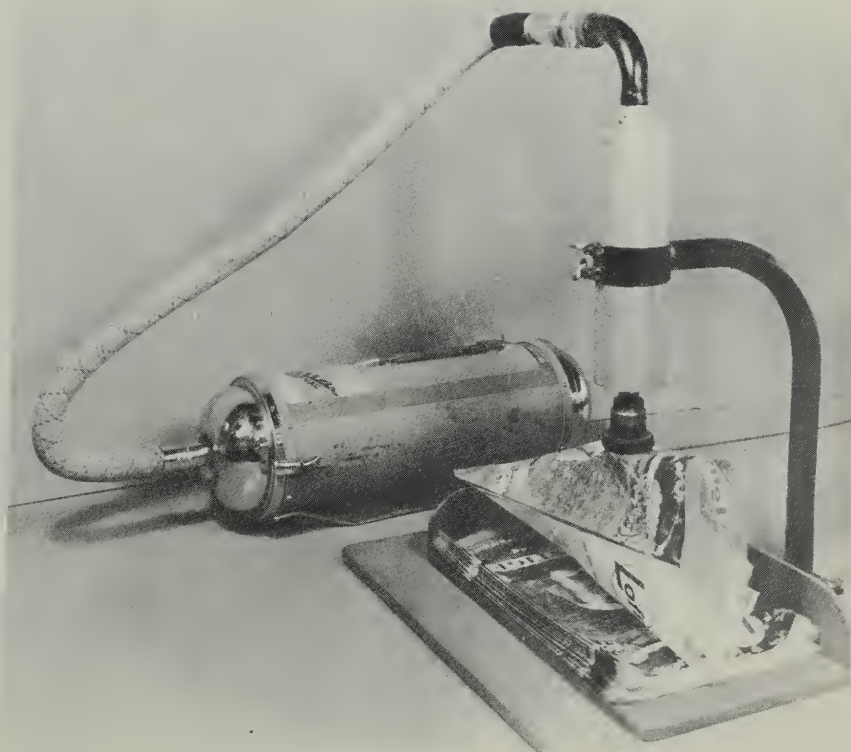


Figure 3. Vacuum bag pickup with bag lifted and opened. Vacuum source shown is positive-pressure blower.

Figure 4. Vacuum bag pickup being operated by household vacuum cleaner. (Note the lifted, opened bag.)



Using the same basic principle as the tag pickup, several bag pickups were designed, constructed, and tested with good results. Figure 2 shows the pickup in contact with the top plastic bag in a stack. Figures 3 and 4 show a bag in the lifted position. Note how the suction cup opens the bag.

The bag pickup shown was tested in a semiautomatic seed packaging operation. The bags were distorted while being lifted which caused them to open and be separated from other bags. The pickup was found to speed the operation and reduce spillage while lessening the mental and physical strain on the operator.

The automatic pickup consists of a loose-fitting piston with a hollow piston rod and is connected to a vacuum pump. The opening in the hollow piston rod is large enough to supply air to the vacuum pump thereby allowing the weight of the piston to keep it in the "down" position. When the open end of the piston rod comes in contact with the object to be lifted, the opening is closed. This creates a vacuum on the piston which raises it to the "up" position, thereby lifting the tag, bag, or carton with it. The piston remains in the "up" position until the item sealing the opening is removed; then it immediately returns to the "down" position and picks up the next item. The cycle is repeated each time the item is removed, making the operation simple and automatic.

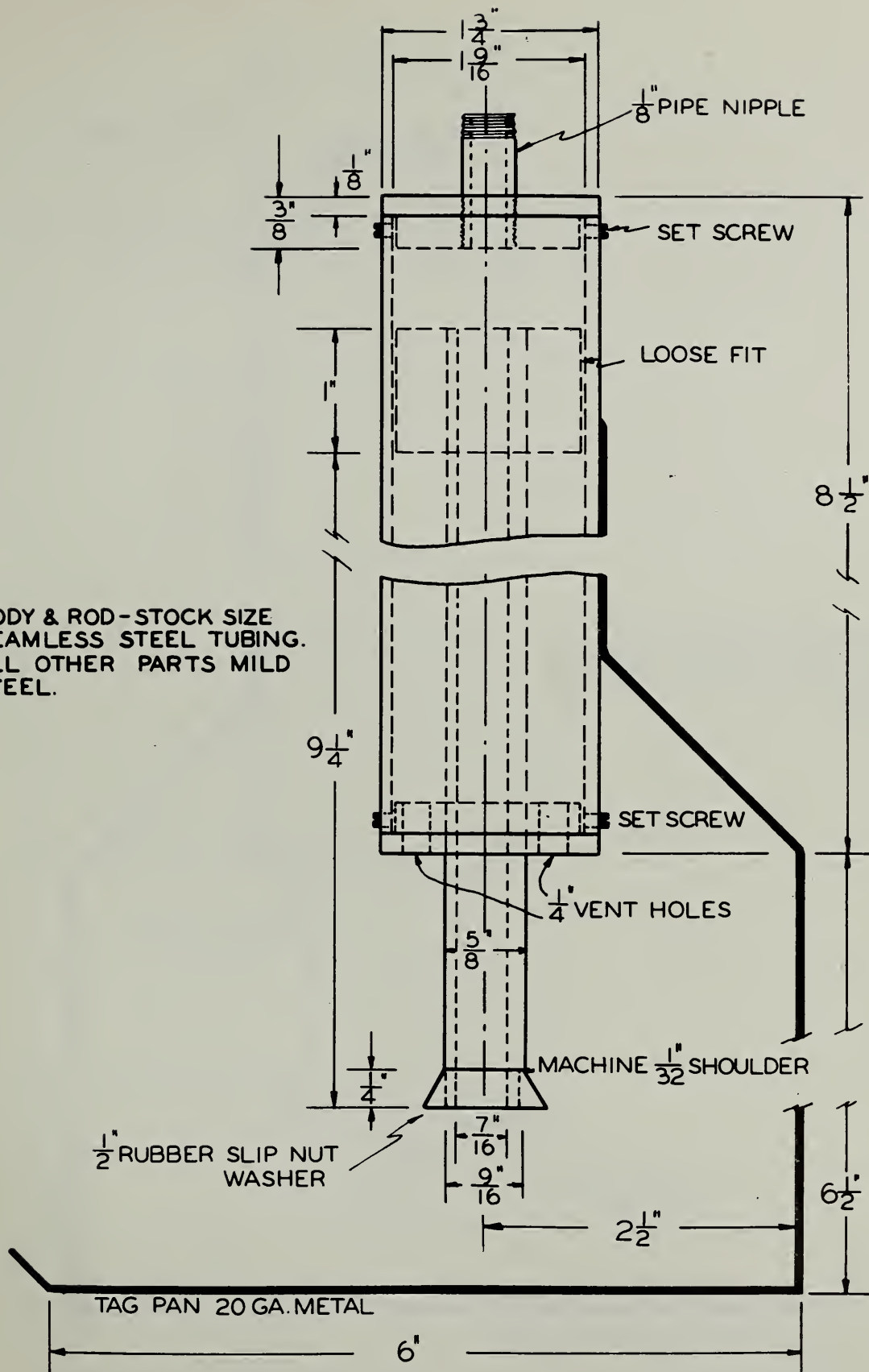
With the correct combination of piston size and vacuum, the machine will lift any object that will seal the piston rod opening.

Figure 5 is a drawing giving the dimensions of the experimental pickup used on tags. Figure 6 details the laboratory unit used in picking up 5-pound carton, and 5-pound and 50-pound plastic and paper bag sizes.

Different vacuum sources that have been used to operate one or more pickups are squirrel-cage fans, positive-pressure blowers, and regular household vacuum cleaners. (See figures 3 and 4.)

In one seed-processing plant, a milking machine pump was used through a system of pipes to create the vacuum for several tag pickups and a number of seed pickups on an inspection table.

For continuous operation of several units in a single plant, a positive pressure blower can be centrally located and vacuum lines run to different locations.



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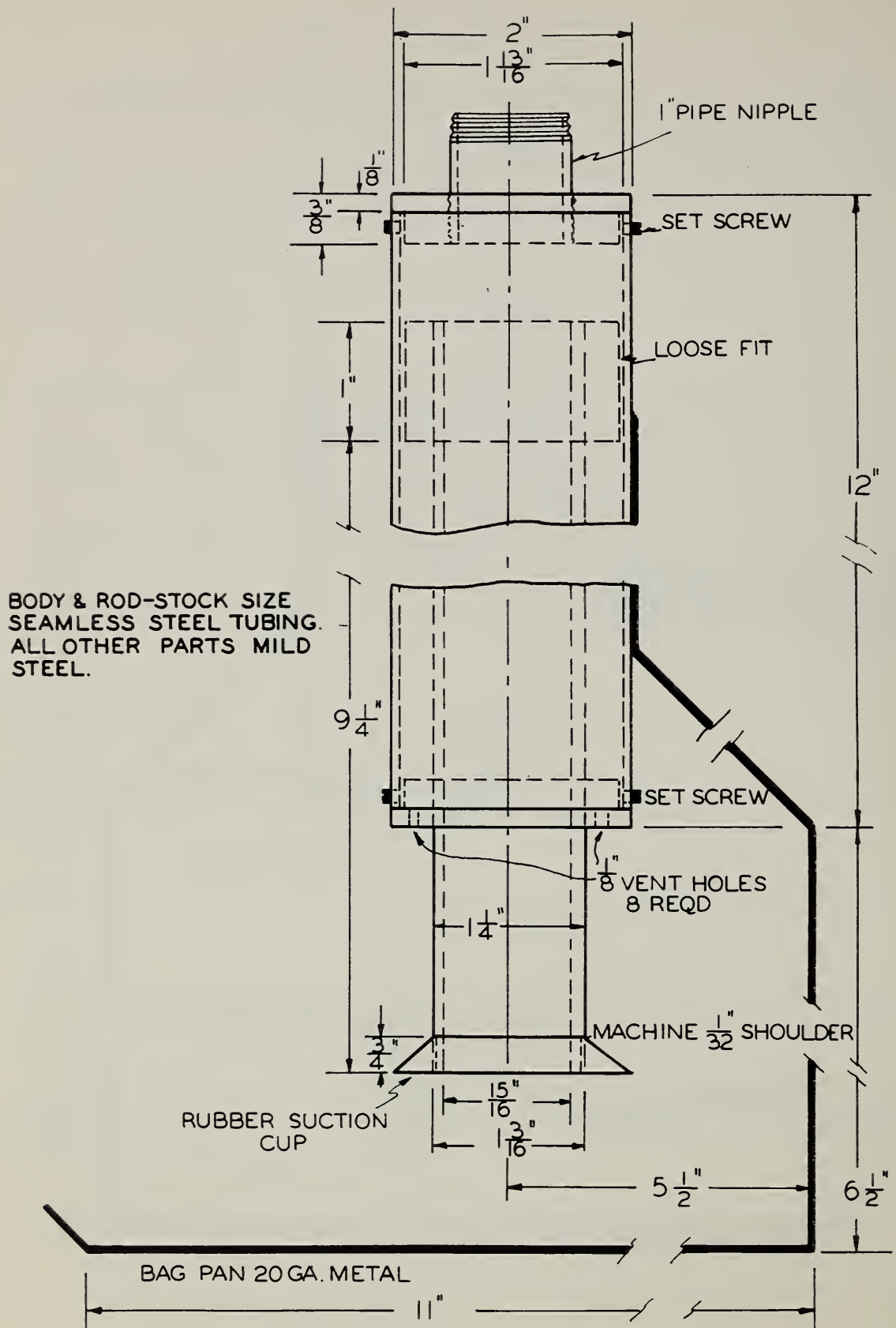


Figure 6. Vacuum pickup for bags and cartons.

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